

RANGE OPERATION CENTER (ROC) - Large



Representative ROC-Large Photo

Function: The ROC-Large houses the range control stations (RCS), data termination racks (DTR), communication racks, instrumentation equipment, communications equipment, heating/ventilation/air conditioning (HVAC), as well as providing accommodations for range personnel. All targetry and scenario-driven training is controlled from this facility. The ROC-Large is the central communications hub for all cabling systems downrange, the cantonment area, and installation connections.

General: The Range Operations Center - Large (ROC-Large) provides office space, a break room, and storage for personnel conducting training exercises, as well as an observation room for viewing downrange training exercises either by line-of-sight or camera video as well as a real-time view of the range scenario control computers. Space is also provided in the communication room for required electronics and communications equipment. A mechanical/electrical room is provided for HVAC, panelboards, and other equipment. The ROC-Large shall be positioned near the baseline if possible to provide the observation room with the most allowable view of downrange exercises that the topography permits. When line-of-sight is not possible, the ROC-Large shall be completely camera dependent for observation of the training area with equipment provided by the Other Appropriations-Army (OPA) contractor. The control room is the heart of downrange operation scenario control. The ROC-Large shall be designed with deep roof overhangs and pull-down shades to reduce solar glare. The range flagpole shall have a red “range is hot” light atop the pole that can be switched on or off from the ROC-Large.

Facility Development: The information included in this section provides the overall concept for the Range Operation Center (ROC) operation for Digital Ranges and Combined Arms Training Facilities. The entire suite of standard buildings is currently under revision. Contact the MCX for building layouts on specific projects. The building layout and sketches shown in this section may not explicitly match the new layouts, but the function of the equipment and the components described in this section should be incorporated to all new ROC facilities.

For Instrumented Ranges the function of the ROC-Large has been divided between the Range Tower and the AAR. CACTF will use a combined ROC/AAR Facility.

Design Drawings: Contact the MCX for building layouts for use on specific projects..

Siting Criteria: The ROC-Large shall be located approximately 15 to 50 meters behind the baseline in an area offering an unobstructed view of all of the baseline and visibility of as much of the downrange area that is economically practical. The console operator should have an unobstructed view of the firing line and downrange firing positions either by line-of-sight or camera video coverage.

Typical Configuration:

Size:	185.8 square meters (2000 square feet)
Occupancy:	20
Foundation:	Concrete slab on-grade with turned-down edges
Shell:	Reinforced, split-faced CMU
Roof:	Insulated Standing Seam Metal Roof (SSMR) system
Doors:	Insulated hollow metal
Windows:	Aluminum frame with polycarbonate glazing
Interior Finishes:	Painted CMU, acoustical tile ceiling, sheetrock/metal studs
HVAC:	Central heat and air - site adapted. Dedicated system for communications room with emergency shut-off capabilities
Standard Lighting:	Fluorescent
Special Lighting:	Red lenses or red lamps
Lightning Protection:	Roof mounted air terminals
Power:	120/240VAC, single phase, 3-wire secondary
Telephone:	Standard Voice Cable (optional)
Installation Network Connection:	Fiber Optic Cable (optional)

Electrical/Communications: This section discusses electrical/communication considerations unique to this specific structure type. Downrange power, communication, load, transformers, trenching requirements, etc., are discussed elsewhere in this manual.

Electrical Service: Electrical service to the ROC-Large shall be 120/240Volt, single phase, 3-wire secondary; 277/480Volt, three phase, 4-wire; or 120/208Volt,

three phase, 4-wire secondary. The voltage supplied must be maintained within 5 percent at a frequency of 60 Hz, +/-0.5. Surge suppression devices shall be provided at the service entrance for protection of the ROC-Large distribution system. Rigid steel conduit shall extend a minimum of 1524mm (5 feet) beyond the outside of the building foundation for power circuits entering or leaving the building. The ROC-Large power distribution panel shall have separate circuits for lighting, convenience outlets, communications, and HVAC equipment.

Digital Ranges - The raised computer floor in the communications and control room must maintain a minimum depth of 305mm (12in) and form an interconnecting pathway between the communications and control rooms. Additionally, two dedicated 120 V, 20A duplex receptacles outlets on separate circuits should be provided in the base of each communications rack and DTR installed floor boxes mounted flush in the raised floor. These outlet boxes shall be wired to junction boxes by flexible conduit to allow raised floor tiles to be moved for access under the floor. A separate power distribution panel shall be provided for the communications equipment installed in the Communications Room. A UPS will be provided and installed by others and installed in the Communications Room. The weight load of the UPS shall be considered when providing the raised floor in the Communications Room. A manual transfer scheme consisting of a double-throw safety switch and a separate UPS disconnect switch shall be provided in the design to allow for simple installation of the UPS by others and allow for a bypass circuit to utility power. Floor mounted UPS, double throw safety switch and separate power distribution panel will not be provided for CACTFs.

Each ROC workstation shall have a quad outlet fed by a dedicated 20 amp circuit. Additionally, a single gang box installed with a face plate flush in the wall, 18" above finished floor, shall be provided at each ROC workstation. This box shall be connected to the under floor cable tray system by a 1" conduit provided with a nylon pull string. Coordinate the exact locations of each ROC workstation with the instrumentation contractor during the design process. The designer should not assume the locations to be typical from previous designs.

CACTF - Cable tray is to be installed above drop ceiling and form an interconnecting pathway between the Communications and Control Rooms. Vertical cable tray elbows shall be installed above DTRs to allow smooth transition of cables from DTR to horizontal cable tray. Additionally, two 60A wall mounted disconnects shall be installed in Communications Room for rack mounted UPS to be installed by others. An empty conduit with pull string should be installed from each disconnect to a junction box mounted above drop ceiling. Junction box location should be coordinated with PEO-STRI.

Each ROC workstation shall have a quad outlet fed by a dedicated 20 amp circuit. The ROC workstations shall be connected to the wireway system via 12" x 4" cable tray. Vertical cable tray serving ROC workstations shall be recessed in wall and terminate 18" AFF with a removable section for cable access. Like with the Digital

Range ROC, the locations of the workstations shall be coordinated with instrumentations contractor during the design process.

A mushroom type button shall be provided at the door of the Communications Room. This button shall allow for the HVAC to the room the shutoff and disconnect the power feeding all communications equipment in this room.

Lighting: Fluorescent lighting shall be used. Red lamps or lenses for night operation shall be provided with protected switching to prevent accidental illumination of white lights during night operations. The control room requires a lighting system with dimming capabilities. Where necessary, low-level in-ground lights (similar to airfield markers), may be used for vehicle parking areas and walkways. There is not an Army standard for the lighting system. The designer must ensure that the customer's lighting requirements are met.

Night Operations Lighting: To prevent interference with specialized equipment used during night operations, red lenses or red lamps must be provided in addition to standard lighting if the following conditions exist.

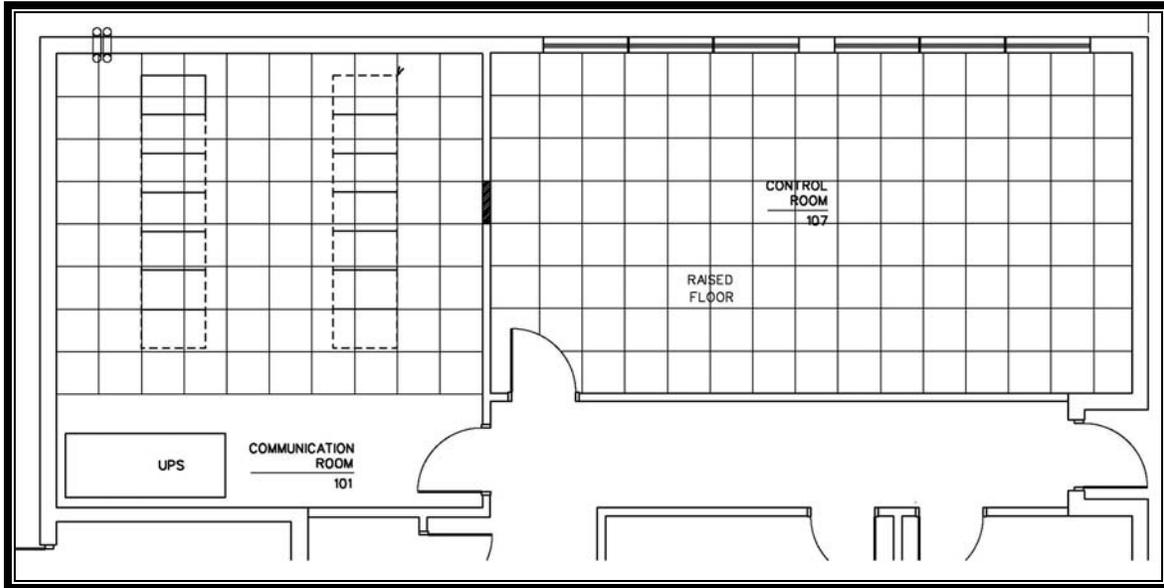
- Night training will be performed
- ROCA buildings are near the firing positions
- ROCA building has windows that cannot be covered.

Separate switching for the standard and red lighting shall also be provided, located near points of egress.

Grounding: Grounding is required for safety and for lightning protection. The ROC-Large ground system shall consist of a buried, No. 4/0 AWG, stranded, copper conductor and ground rods all interconnected to yield an earth resistance of 25 ohms or less. Cable connections and connections to the ground rods and structural steel shall be exothermically welded. The DTR and communication rack ground points shall be connected to a Single Ground Point (SGP) with a minimum No.6 AWG, insulated, stranded, copper cable. The SGP shall be connected to the ground system with at least a No. 4/0 AWG, bare, copper cable. Any additional DTRs or communication racks shall be bonded together with the same type and size copper ground.

Communication-Targetry Control: The ROC-Large is the main communications hub for all facility cabling. Downrange targets shall be connected to the Data Termination Rack (DTR) with direct burial fiber optic cabling via conduit ductbank at the ROC-Large filled with innerduct to facilitate future expansion. The DTR is an enclosed equipment rack where all fiber optic cables are terminated in a cross-connect panel with industry standard type SC connectors. The actual number of instrumentation racks will vary depending upon the range type and design. The raised computer floor in the communications and control room must maintain a minimum depth of 305mm (12in) and form an interconnecting pathway between the communications and control rooms. Rigid Steel Conduit (RGS) shall extend a

minimum of 1524mm (5ft) beyond the outside of the building foundation for communication cabling entering or leaving the building.



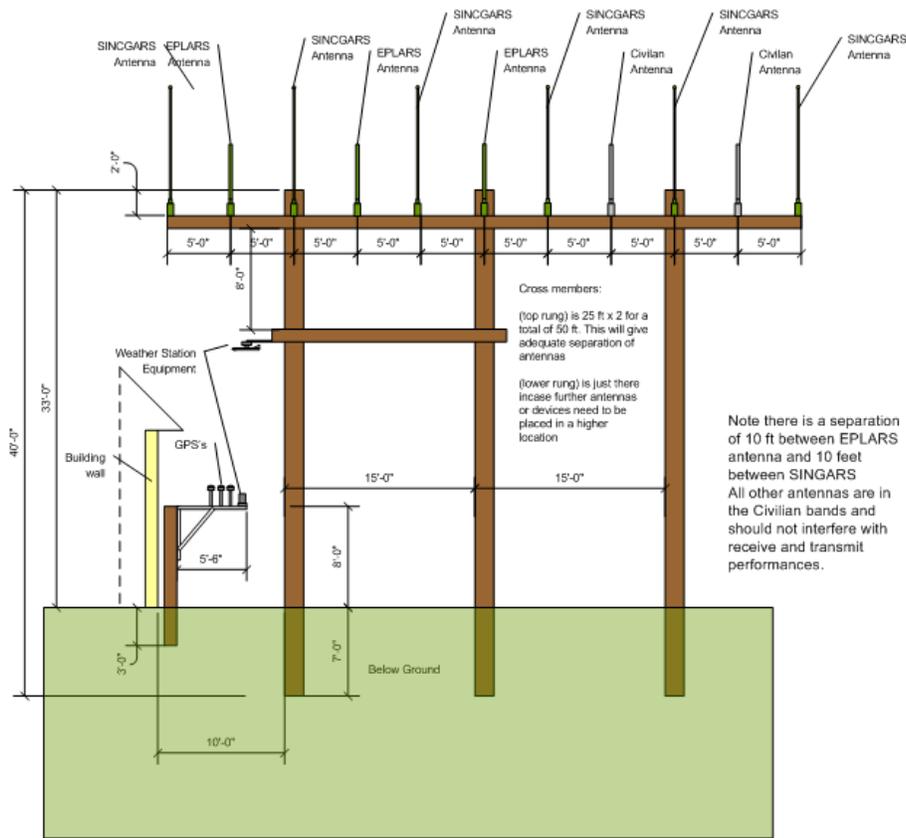
Representative ROC-Large Communication/Control Room (Not to Scale)

A minimum 24-strand fiber optic connection is required between the ROC-Large and the AAR-Large for transporting video and data information. All fiber connections made in the ROC-Large will utilize the SC-form connectors.

Other Procurement-Army (OPA) funded communications equipment, including the MDP, can share DTR rack space to convert the fiber optic cables to industry standard. Ethernet copper network cable may be used for connections with the Range Control System (RCS) for targetry control, as well as in combination with other instrumentation requirements. The target/command and control system shall be Ethernet-based. There should be coordination between the OPA contractor and MCD contractor to determine instrumentation requirements for displaying scenario video in the observation room.

Digital Ranges: Antenna tower shall be constructed by MCD contractor adjacent to ROC. Tower shall be located 10' from exterior of building. Tower shall be a minimum of 40' in height and consist of three coplanar poles mounted 15' in separation. Horizontal antenna mounting bracket should be located 2' from the top of poles and be 50' in length, allowing 10' to extend beyond each outer pole. In addition to the antenna tower, a pole mounted platform is required to be constructed next to building for installation of GPS equipment. Platform shall be at a height of 8' above grade. See detail below. A 4" conduit should be installed below grade from the communication room to the base of the antenna tower and the GPS platform. Conduits should be capped and provided with a pull wire. Orientation and exact location of poles should be coordinated with PEO-STRI during the design phase.

(ROC) Antenna Tower



GPS and Weather Station Equipment have a limited cable length therefore place on 8 ft pole near building. Having an 8 ft pole with platform will keep warranties in check as we will not have to modify the buildings exterior wall.

ROC SINGGARS ANTENNA TOWER

Environmental: The environmental conditions for the communications room shall be: Operational environment of +23.3°C (74°F) +/- 2.25°C (4°F); non-operational environment of -34.44°C (-30°F) to +65.56°C (+150°F). Humidity should be between 10% - 80% RH non-condensing. Environmental requirements for personnel comfort shall be in accordance with UFC 3-410-01FA.

Communication Room HVAC Design: Provide a dedicated, ducted HVAC unit for the Communication Room which is capable of meeting the required operational environment. Cooling set point used in HVAC calculations shall be no higher than 74°F and heating setpoint shall be no lower than 70°F. Air supply devices shall be capable of providing adequate air distribution to the front of the racks, on both sides of the aisle, and around the UPS. Supply air devices shall provide enough throw for supply air to reach the lowest equipment near the floor. Return air devices shall be located so that they assist the integral top mounted rack fans (provided by others) in removal of heat from the racks. Locate thermostat to minimize temperature gradients in the room.

Telephone/Network Communication: Telephone communications and an installation network connection are not required; if these communications are desired, they must be coordinated with the local installation Directorate of Information Management (DOIM).